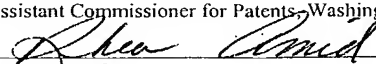



<p>FORM PTO-390 OFFICE (REV 11-2000)</p> <p style="text-align: center;">U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK</p> <p style="text-align: center;">TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. § 371</p>		<p>ATTORNEY'S DOCKET NUMBER</p> <p style="text-align: center;">321402000200</p> <hr/> <p>U.S. APPLICATION NO. (If known, see 37 CFR 1.5)</p> <p style="text-align: center; font-size: 1.5em;">10/088155</p>
INTERNATIONAL APPLICATION NO. PCT/CZ/00/00067	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
TITLE OF INVENTION		
NON-TOXIC AND NON-CORROSIVE IGNITION MIXTURE		
APPLICANT(S) FOR DO/EO/US		
Jiri NESVEDA; Stanislav BRANDEJS; and Karel JIRASEK		
<p>Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:</p> <ol style="list-style-type: none"> 1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371. 2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371. 3. <input checked="" type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below. 4. <input type="checkbox"/> The US has been elected by the expiration of 19 months from the priority date (PCT Article 31). 5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2)) <ol style="list-style-type: none"> a. <input checked="" type="checkbox"/> is attached hereto (required only if not communicated by the International Bureau) b. <input type="checkbox"/> has been communicated by the International Bureau. c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US) 6. <input checked="" type="checkbox"/> An English language translation of the International Application under PCT Article 19 (35 U.S.C. 371(c)(2)) <ol style="list-style-type: none"> a. <input checked="" type="checkbox"/> is attached hereto b. <input type="checkbox"/> has been previously submitted under 35 U.S.C. 154(d)(4). 7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)) <ol style="list-style-type: none"> a. <input type="checkbox"/> are attached hereto (required only if not communicated by the International Bureau). b. <input type="checkbox"/> have been communicated by the International Bureau c. <input type="checkbox"/> have not been made, however, the time limit for making such amendments has NOT expired d. <input checked="" type="checkbox"/> have not been made and will not be made 8. <input type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)) 9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)). 10. <input checked="" type="checkbox"/> An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)) <p>Items 11. to 16. below concern document(s) or information included:</p> <ol style="list-style-type: none"> 11. <input type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98 12. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included 13. <input checked="" type="checkbox"/> A FIRST preliminary amendment. 14. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment 15. <input type="checkbox"/> A substitute specification 16. <input type="checkbox"/> A change of power of attorney and/or address letter. 17. <input type="checkbox"/> A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825 18. <input type="checkbox"/> A second copy of the published international application under 35 U.S.C. 154(d)(4). 19. <input type="checkbox"/> A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4). 20. <input checked="" type="checkbox"/> Other items or information: ISR, IPER, Return Receipt Postcard. 		
<p>CERTIFICATE OF MAILING BY "EXPRESS MAIL"</p> <p>Express Mail Label No. EL719395984US Date of Deposit: <u>3-11</u>, 2002</p> <p>I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. § 1.10 on the date indicated above and is addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231.</p> <p style="text-align: center;">  RHEA AMID </p>		


U.S. APPLICATION NO. (if known, see 37 CFR 1.5) *		INTERNATIONAL APPLICATION NO. PCT/CZ/00/00067	ATTORNEY'S DOCKET NUMBER 321402000200
10/088155			
21. <input type="checkbox"/> The following fees are submitted: BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5)): Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO.....\$1,000.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO.....\$860.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO.....\$710.00 International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provision of PCT Article 33(1)-(4)\$690.00 International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4)\$100.00			CALCULATIONS PTO USE ONLY
ENTER APPROPRIATE BASIC FEE AMOUNT =			\$860.00
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).			\$*
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE
Total claims	10 - 20 =		x \$18.00
Independent claims	1 - 3 =		x \$80.00
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$270.00
TOTAL OF ABOVE CALCULATIONS =			\$860.00
<input checked="" type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.			\$
SUBTOTAL =			\$860.00
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).			+
TOTAL NATIONAL FEE =			\$*
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property			+
TOTAL FEES ENCLOSED =			\$860.00
			Amount to be refunded:
			charged:
a. <input type="checkbox"/> A check in the amount of \$* to cover the above fees is enclosed.			
b. <input checked="" type="checkbox"/> Please charge my <u>Deposit Account No. 03-1952, REF. DOCKET NO. 321402000200</u> in the amount of \$_____ to cover the above fees. A duplicate copy of this sheet is enclosed.			
c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees that may be required, or credit any overpayment to <u>Deposit Account No. 03-1952, REF. DOCKET NO. 321402000200</u> . A duplicate copy of this sheet is enclosed.			
d. <input type="checkbox"/> Fees are to be charged to a credit card. WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.			
NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.			
SEND ALL CORRESPONDENCE TO:			
Kawai Lau Morrison & Foerster LLP 3811 Valley Centre Drive Suite 500 San Diego, California 92130-2332			
 SIGNATURE			
Kawai Lau Registration No. 44,461			

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Date of Deposit: March 11, 2002

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RHEA AMID

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the application of:

NESVEDA et al.

Serial No.: To be assigned

Filing Date: Herewith

For: NON-TOXIC AND NON-CORROSIVE
IGNITION MIXTURE

Examiner: To be assigned

Group Art Unit: To be assigned

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Prior to calculation of fees and examination of this application, please amend the application as follows:

6. (amended) The mixture according to claim 2 wherein said nitrocellulose is applied in an organic solvent and functions, at the same time, as the bonding agent and energy component.

8. The mixture according to claim 6 wherein said organic solvent is acetone.

9. The mixture according to claim 5 wherein said nitrocellulose is applied in an organic solvent and functions, at the same time, as the bonding agent and energy component.

10. The mixture according to claim 9 wherein said organic solvent is acetone.

REMARKS

Attached hereto is a marked-up version of the changes made to the specification by the above amendment. The attached page is captioned "**Version with markings to show changes made.**"

The specification has been amended to include pages from the Annex to the IPER and to refer to the relationship of the instant national phase application to the previously filed PCT application and to claim benefit of priority from PV 1999-3305.

Claim 1 has been amended to remove changes made before the international examining authority and to conform its language to U.S. practice. Its scope has not been changed relative to claim 1 as originally filed with the PCT application.

Claim 6 has been amended to remove its multiple dependency from claims 2 and 5 and to conform its language to U.S. practice. The subject matter of claim 6 as originally filed is now in claims 6 and 8-10, with claims 6 and 8 dependent from claim 2 and claims 9 and 10 dependent from claim 5. A comparison of claim 6 versus claim 6 as amended and new claims 8-10 shows that no narrowing of claim scope or subject matter has occurred.


No new matter has been introduced, and entry of the amendments is respectfully requested.

In the event that the Patent Office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Assistant Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing docket no. **321402000200**. However, the Assistant Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

Respectfully submitted,

Dated: March 11, 2002

By:


Kawai Lau
Registration No. 44,461

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Version with markings to show changes made.

IN THE SPECIFICATION:

Please amend the specification as follows:

Please enter substitute pages 1 and 1a from the Annex to the International Preliminary Examination Report (IPER) per MPEP 1893.01(b)(2).

On page 1 of the specification, immediately after the title, please insert the following:

--This application is a U.S. National Phase Patent Application of PCT/CZ00/00067, filed September 11, 2000, and claims benefit of priority under 35 U.S.C. 119 from PV 1999-3305, filed September 17, 1999, which is hereby incorporated by reference as if fully set forth.--

IN THE CLAIMS:

Please amend the claims as follows:

Please enter substitute page 11 from the Annex to the International Preliminary Examination Report (IPER) per MPEP 1893.01(b)(2).

1. (amended) A non-toxic and non-corrosive ignition mixture created by combining the energy system with the pyrotechnic system [characterized by the fact that] wherein the mixture [composed of the energy and pyrotechnic systems consists of] comprises 5 up to 40 weight percent of a high explosive, selected from the group of nitroesters and nitramines, 5 up to 40 weight percent of a sensibilizer, which is tetrazene or salts or derivatives of tetrazoles, 5 up to 50% of an oxidizing agent selected from the group of oxides and peroxides of metals or from the group of salts of inorganic oxygen-containing acids or from the group of

complex salts, 1 up to 20 weight percent of [amorphous] boron as a fuel, 5 up to 30 percent of a friction agent and optionally 0.1 up to 5 weight percent of a bonding agent.

6. (amended) The mixture according to [claims 2 and 5 characterized by the fact that] claim 2 wherein said nitrocellulose is applied in [the] an organic solvent [such as acetone] and functions, at the same time, as the bonding agent and energy component.

Non-toxic and non-corrosive ignition mixture

Technical field

The invention concerns the field of ammunition production, especially the production of ignition mixtures for hunting and sports ammunition.

Background Art

All sorts of known ignition mixtures, which are presently used, i.e. both already dated mixtures based on mercuric fulminate, calcium chlorate and antimony sulphide, and newer non-corrosive mixtures based on tetrazene, lead trinitroresorcinate, lead dioxide, calcium silicide and antimony sulphide, emit during discharge a large amount of toxic heavy metals and they do not meet the environmental standards.

An example of such mixture is also the percussion ignition additive according to German patent No. 1 243 067, which contains 200 g of powdered metallic copper, 200 g of amorphous boron, 700 g of lead dioxide or powdered barium peroxide, 200 g of calcium silicide and 20 g of tetrazene.

The above-mentioned drawbacks of said mixtures are the reason why an extensive research has been carried out in the last ten years with an aim to develop a mixture that would not contain compounds of heavy metals such as lead, barium, mercury, antimony, and, at the same time, would retain non-corrosive properties of trinitrate mixtures. The result is a mixture in which an aromatic diazo compound without metal content – dinol – fulfils the function of a primary explosive and tetrazene remains as a sensitizer. The pyrotechnic system is in this case composed of a new oxidizing agent, zinc peroxide and titanium powder. The mixture can contain also other components such as friction agents, typically ground glass, and active propellants such as various sorts of nitrocellulose and nitroglycerine powders.

Mixtures based on dinol are also known in which basically only the pyrotechnic system is modified. Oxidizing agents used include various oxides of metals – potassium nitrate, strontium nitrate, basic nitrates of copper and copper-ammonium nitrate and tin compounds. Neither these mixtures are a final solution.

1a

US patent No. 5,167,736 describes a primer mix containing dinol as the main explosive in combination with boron. Boron in this case is rather coarse-grained, about 120 mesh. The basic problem of such mixtures is the primary explosive itself – dinol. It is a carcinogenic compound with very unpleasant physiological effects. That is why there have been noted attempts to avoid dinol completely. EP 0656332 A1, in which the mixture is based only on pyrotechnic system and does not contain any explosive, offers one such solution. Here, the propellant is a hyperactive zircon powder, the oxidizing agent is a mixture of potassium nitrate and manganese dioxide, and the energy component is penthrite.

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There is no doubt that this mixture is according to the data of the inventors fully functional even though here a serious problem can also arise. It can be zircon itself. As the inventors themselves state, the active form of zircon is ignited by the influence of minute energy impulse both mechanically and thermally. It is well known that highly active metal powders, especially zircon, are pyrophoric and extremely reactive. They react both with air oxygen creating oxides and with air nitrogen creating nitrides and also with humidity creating hydrides. During transportation and storage, they have to be stored under water and during the production of mixtures water must be displaced using a water-immiscible organic solvent. According to the inventors, isopropyl alcohol is the most advantageous. The technology is then based on classical embroccating of pasty mixture into primer caps, however with the difference that the bonding agent is not an aqueous solution of the given organic compound but a solution of aerosil in isopropyl alcohol. During the production and the feeding of such mixtures, serious problems can arise such as handling extremely reactive zircon and moreover also technological problems resulting from the use of large amounts of organic solvents during the production.

Disclosure of the Invention

The above drawbacks are solved and totally removed by a non-toxic and non-corrosive ignition mixture the essence of which lies in that in the energy system, the primary explosive of the dinol type is replaced by a high explosive, which is activated by a sensitizer of the tetrazene type or by salts and derivatives of tetrazoles. Nitroesters such as penthrite and hexanitromanite but also nitrocellulose in the form of granulate and also nitroamines such as hexogene, octogene and tetryle, can be used as the high explosive. In order to increase the ignition power, the mixture must be supplemented with an appropriate pyrotechnic system. Mixtures with powder boron turned out to be the most suitable, especially those with brown, so-called amorphous, boron with large specific surface which in the case of commonly available specimens reaches 5 to 25 m²/g. Extensive testing has proven that amorphous boron is an excellent fuel and that it is able to create a perfect redox-system with any metal oxide, independent of valence, further with metal peroxides and all known salts of inorganic oxygen-containing acids.

Into the pyrotechnic system with boron, oxidizing agents can be selected from the group of compounds such as oxides of univalent metals: cuprous (I) - Cu₂O, bivalent: cupric (II) -

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CuO, zinc (II) - ZnO, oxides of multivalent metals: bismuth (III) - Bi_2O_3 , bismuth (IV) - BiO_2 and bismuth (V) - Bi_2O_5 , ferric (III) - Fe_2O_3 , manganese (IV) - MnO_2 , stannic (IV) - SnO_2 , vanadic (V) - V_2O_5 and molybdenum (VI) - MoO_3 , peroxides of zinc - ZnO_2 and calcium - CaO_2 , saltpetre - KNO_3 and some special salts such as basic bismuth nitrates - $4\text{BiNO}_3(\text{OH})_2$, $\text{BiO}(\text{OH})$ and $\text{BiONO}_3 \cdot \text{H}_2\text{O}$, basic copper nitrate - $\text{Cu}(\text{NO}_3)_2 \cdot 3\text{Cu}(\text{OH})_2$, diammo-copper nitrate - $\text{Cu}(\text{NH}_3)_2(\text{NO}_3)_2$, basic tin nitrate - $\text{Sn}_2\text{O}(\text{NO}_3)_2$. Boron creates the fastest burning system with compounds of bismuth. Systems with the highest heating effect originate when potassium nitrate, cupric oxide, ferric oxide and manganese oxide are used. The products of combustion can be both low-melting boron (III) oxide - B_2O_3 and volatile boron (II) oxide - BO which is more stable at higher temperatures, possibly also boron nitride - BN. The presence of these compounds in the products of combustion is very desirable from the viewpoint of perfect ignition of powder cartridge charges. In spite of its extraordinary reactivity, boron is chemically stable and it is not dangerous for handling. The expenses related to boron are compensated by its minimal content in stoichiometric mixtures, which does not exceed 20 weight percent. In order to increase sensitivity to strike by a blow, it is necessary to supplement the mixture with an appropriate friction agent, which is ground glass.

Considering that ignition mixtures produced in this way are in a very fine form it seems that the most suitable technology is handling when wet and, therefore, the mixture can also contain a certain amount of a water-soluble bonding agent. Commonly known bonding agents such as acacia gum, dextrin, polyvinyl alcohol, carboxymethyl cellulose and others are the most suitable. Should it be necessary to handle the mixture when dry, it would need to be granulated first. Granulation can be done both by using the above-mentioned bonding agents in water solutions or by using bonding agents soluble in organic solvents, e.g. nitrocellulose in acetone. The pyrotechnic system can be also grained after pressing and the grained product can be later used in the mixtures. In this case, the mixture does not have to contain any bonding agent because it can be easily fed when dry.

Within several years extensive tests have been performed both with primer caps filled with mixtures of the invention and with ammunition equipped with these primer caps.

The results of said functional tests show that it is possible, by a suitably chosen combination of the energy and pyrotechnic systems, to achieve desired characteristics of the mixture for a particular type of the primer. For example, for the smallest types of primer caps having the shortest reaction times, destined for the pistol and revolver ammunitions, it is necessary that

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the energy and pyrotechnic systems show as high reactivity as possible and have a high energy content at the same time. Primers showing the highest reactivity include nitro esters, which can be most easily initiated, among them mainly mannite hexanitrate, which is however predestined for special use due to its high cost and somewhat lower chemical stability. On the other hand, penthrite has shown itself as an ideal explosive with a wide range of utility. Similarly, nitrocellulose is a universal and multipurpose explosive, which can play roles of the combustible, the propellant and the binder at the same time. Nitramines are at a lower level in terms of effect than nitro esters and their initiability is lower. This renders them useful in primer caps having larger dimensions and longer reaction times, wherein they can be applied better than nitro esters, the very high effect of which could even be disadvantageous in some cases.

For comparison, results are presented of measurements of the primer caps 4.4/0.4 BOXER, destined for cartridges 9 mm LUGER, by the method DROP-TEST, in which we obtained a graphical function of the pressure values in dependence on the reaction time of the primer. The mixture of Example 20 was compared to a classical mixture based on lead trinitroresorcinate, the charge of which in the primer cap is by about 20 % higher. For both mixtures, identical values were obtained for maximal pressures - 100 bars - and reaction times - 100 microseconds.

Parameters of inner ballistics of the cartridge 9 mm LUGER with the primer cap filled with the above-described mixture were also measured. When a suitably chosen powder is used, it is possible, for a bullet weighing 7.5 g, to achieve muzzle velocities about 420 m/s without exceeding admissible values of maximal pressures in the chamber. Besides, functional shootings from various types of short and automatic weapons were performed, wherein the inventive ammunition showed reliable functioning.

It has been found that the mixtures of the invention, which contain tetrazene as the main explosive, show extraordinary handling safety. During burning of this mixture no development has been observed of any toxic combustion gases or compounds able to cause corrosion of the weapon.

Ignition mixtures created by combination of energy and pyrotechnic systems according to the mentioned essence of the invention are expressed by the following scheme:

data are presented in weight percentages

- high explosive 5 to 40 %

The make is presented in weight percentages.

tetrazene	25 %
penthrite	25 %
4BiNO ₃ (OH) ₂ ·BiO(OH)	36.4 %
B	3.6 %
ground glass	10 %

a) dry variant -- without bonding agent		b) wet variant	
tetrazene	35 %	tetrazene	35 %
penthrite	05 %	penthrite	05 %
4BiNO ₃ (OH) ₂ .BiO(OH)	18 %	4BiNO ₃ (OH) ₂ .BiO(OH)	18 %
B	2 %	B	2 %
glass	10 %	acacia gum	0.5 %
		glass	19.5 %

a) dry variant		b) wet variant	
tetrazene	25 %	tetrazene	25 %
penthrite	25 %	tetryle	25 %
BiONO ₃ .H ₂ O	34 %	BiONO ₃ .H ₂ O	34 %
B	5.5 %	B	5.5 %
glass	10 %	acacia gum	0.5 %

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nitrocellulose	0.5 %	glass	10 %
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Example 4 – mixture with higher heating effect

a) dry variant – without bonding agent

tetrazene	35 %
penthrite	15 %
CuO	34 %
B	6 %
glass	10 %

b) wet variant

tetrazene	25 %
penthrite	25 %
CuO	34 %
B	5.5 %
polyvinyl alcohol	0.5 %
glass	10 %

Example 5

a) dry variant

tetrazene	35 %
penthrite	15 %
Bi ₂ O ₃	36 %
B	3.5 %
nitrocellulose	0.5 %
glass	10 %

b)-wet variant

tetrazene	25 %
hexogene	25 %
Bi ₂ O ₃	36 %
B	3.5 %
polyvinyl alcohol	0.5 %
glass	10 %

Example 6

a) dry variant

tetrazene	35 %
penthrite	15 %
MnO ₂	31.5 %
B	8 %
nitrocellulose	0.5 %
glass	10 %

b) wet variant

tetrazene	25 %
tetryle	25 %
MnO ₂	31.5 %
B	8 %
acacia gum	0.5 %
glass	10 %

Example 7

a) dry variant

tetrazene	25 %
penthrite	25 %

b) wet variant

tetrazene	25 %
penthrite	25 %

ZnO	34 %
B	5.5 %
acacia gum	0.5 %
glass	10 %

only dry variant

tetrazene	25 %
penthrite	25 %
Fe ₂ O ₃	34 %
B	5.5 %
nitrocellulose	0.5 %
glass	10 %

a) dry variant

tetrazene	25 %
penthrite	25 %
V ₂ O ₅	30 %
B	9.5 %
nitrocellulose	0.5 %
glass	10 %

tetrazene	25 %
penthrite	25 %
V ₂ O ₅	30 %
B	9.5 %
acacia gum	0.5 %
glass	10 %

a) dry variant

tetrazene	35 %
penthrite	15 %
SnO ₂	34 %
B	5.5 %
nitrocellulose	0.5 %
glass	10 %

tetrazene	25 %
penthrite	25 %
SnO ₂	34 %
B	5.5%
acacia gum	0.5 %
glass	10 %

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Example 11

a) dry variant

tetrazene	25 %
penthrite	25 %
MoO ₃	30 %
B	9.5 %
nitrocellulose	0.5 %
glass	10 %

b) wet variant

tetrazene	25 %
penthrite	25 %
MoO ₃	30 %
B	9.5 %
acacia gum	0.5 %
glass	10 %

Example 12

a) dry variant

tetrazene	25 %
penthrite	25 %
ZnO ₂	30 %
B	9.5 %
nitrocellulose	0.5 %
glass	10 %

b) wet variant

tetrazene	25 %
tetryle	25 %
ZnO ₂	30 %
B	9.5 %
polyvinyl alcohol	0.5 %
glass	10 %

Example 13

only dry variant

tetrazene	25 %
hexogene	25 %
CaO ₂	30 %
B	9.5 %
nitrocellulose	0.5 %
glass	10 %

Example 14

only dry variant – mixture with higher heating effect

tetrazene	25 %
penthrite	25 %
KNO ₃	33.5 %
B	6 %

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nitrocellulose	0.5 %
glass	10 %

Example 15

a) dry variant

tetrazene	35 %
penthrite	15 %
$\text{Cu}(\text{NO}_3)_2 \cdot 3\text{Cu}(\text{OH})_2$	31.5 %
B	8 %
nitrocellulose	0.5 %
glass	10 %

b) wet variant

tetrazene	25 %
hexogene	25 %
$\text{Cu}(\text{NO}_3)_2 \cdot 3\text{Cu}(\text{OH})_2$	31.5 %
B	8 %
acacia gum	0.5 %
glass	10 %

Example 16

a) dry variant

tetrazene	35 %
penthrite	15 %
$\text{Cu}(\text{NH}_3)_2(\text{NO}_3)_2$	27.5 %
B	12 %
nitrocellulose	0.5 %
glass	10 %

b) wet variant

tetrazene	25 %
hexogene	25 %
$\text{Cu}(\text{NH}_3)_2(\text{NO}_3)_2$	27.5 %
B	12 %
acacia gum	0.5 %
glass	10 %

Example 17 – with highly reactive oxidizing agent

a) dry variant

tetrazene	25 %
penthrite	25 %
BiO_2	33.5 %
B	6 %
nitrocellulose	0.5 %
glass	10 %

b) wet variant

tetrazene	25 %
hexogene	25 %
BiO_2	33.5 %
B	6 %
acacia gum	0.5 %
glass	10 %

Example 18 – analogous mixture

a) dry variant

tetrazene	25 %
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b) wet variant

tetrazene	25 %
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penthrite	25 %	tetryle	25 %
Bi ₂ O ₅	33 %	Bi ₂ O ₅	33 %
B	6.5 %	B	6.5 %
nitrocellulose	0.5 %	acacia gum	0.5 %
glass	10 %	glass	10 %

Example 19 – a specific case where oxidizing agent works as auxiliary explosive

a) dry variant

tetrazene	25 %
penthrite	25 %
Sn ₂ O(NO ₃) ₂	32 %
B	8 %
glass	10 %

b) wet variant

tetrazene	25 %
hexogene	25 %
Sn ₂ O(NO ₃) ₂	31.5 %
B	8 %
acacia gum	0.5 %
glass	10 %

Example 20

use of two oxidizing agents

tetrazene	30 %
penthrite	7.5 %
4BiONO ₃ (OH) ₂ .BiO(OH)	18 %
KNO ₃	17 %
B	5 %
nitrocellulose	0.5 %
glass	22 %

Industrial applicability

Mixtures that are in accordance with technical solution are utilizable in the field of ammunition production for the production of primers for central ignition cartridges intended for sports, hunting and practice purposes, or for shooting cartridges.

CLAIMS

1. A non-toxic and non-corrosive ignition mixture created by combining the energy system with the pyrotechnic system characterized by the fact that the mixture composed of the energy and pyrotechnic systems consists of 5 up to 40 weight percent of a high explosive, selected from the group of nitroesters and nitramines, 5 up to 40 weight percent of a sensibilizer, which is tetrazene or salts or derivatives of tetrazoles, 5 up to 50 % of an oxidizing agent selected from the group of oxides and peroxides of metals or from the group of salts of inorganic oxygen-containing acids or from the group of complex salts, 1 up to 20 weight percent of amorphous boron as a fuel, 5 up to 30 weight percent of a friction agent and optionally 0,1 up to 5 weight percent of a bonding agent.
2. The mixture according to claim 1 characterized by the fact that the high explosive is selected from the group of nitroesters including penthrite, hexanitromannite, nitrocellulose, or from the group of nitramines including hexogene, octogene, tetryle.
3. The mixture according to claim 1 characterized by the fact that the fuel is amorphous boron with specific surface of 5 up to 25 m²/g.
4. The mixture according to claim 1 characterized by the fact that the oxidizing agent is selected from the group of metal oxides including oxides of copper, zinc, bismuth, iron, manganese, tin, vanadium and molybdenum, or from the group of metal peroxides including peroxides of zinc and calcium, or from the group of salts of inorganic oxygen-containing acids including saltpetre, basic nitrates of bismuth, tin and copper, or from the group of complex salts including diammo-copper nitrate.
5. The mixture according to claim 1 characterized by the fact that the bonding agents are nitrocellulose, polyvinyl alcohol or acacia gum.

6. The mixture according to claims 2 and 5 characterized by the fact that nitrocellulose applied in the organic solvent such as acetone functions, at the same time, as the bonding agent and energy component.
7. The mixture according to claim 1 characterized by the fact that the friction agent is ground glass.

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(54) Title: NON-TOXIC AND NON-CORROSIVE IGNITION MIXTURE

(57) Abstract: A non-toxic and non-corrosive ignition mixture is created by combining the energy system and the pyrotechnic system. The energy system comprises a high explosive from the groups of nitroesters and nitramines and a sensibiliser of the type of tetrazene or derivatives of tetrazoles for its activation. The pyrotechnic system comprises an oxidizing agent from the group of oxides and peroxides of metals, from the group of salts of inorganic oxygen-containing acids, and a fuel which is amorphous boron. The mixture is supplemented with a friction agent which is preferably ground glass. Nitrocellulose, polyvinyl alcohol and acacia gum are used as bonding agents. Mixtures are utilizable in the field of ammunition production for the production of primers, especially for central ignition cartridges.

WO 01/21558 A1

PATENT
Docket No. 321402000200

**COMBINED DECLARATION AND POWER OF ATTORNEY
FOR UTILITY PATENT APPLICATION**

AS BELOW-NAMED INVENTORS, WE HEREBY DECLARE THAT:

Our residence, post office address, and citizenship are as stated below next to our names.

We believe we are the original, first and joint inventors of the subject matter which is claimed and for which a patent is sought on the invention entitled: **NON-TOXIC AND NON-CORROSIVE IGNITION MIXTURE**, the specification of which is attached hereto unless the following box is checked.

☐ was filed on _____ as _____ Application Serial No. _____ and identified as attorney docket number _____

WE HEREBY STATE THAT WE HAVE REVIEWED AND UNDERSTAND THE CONTENTS OF THE ABOVE-IDENTIFIED SPECIFICATION, INCLUDING THE CLAIMS, AS AMENDED BY ANY AMENDMENT REFERRED TO ABOVE.

We acknowledge the duty to disclose information which is material to the patentability as defined in 37 C.F.R. § 1.56.

We hereby claim foreign priority benefits under 35 U.S.C. § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed:

Application No.	Country	Date of Filing (day/month/year)	Priority Claimed?
PCT/CZ/00/00067	WO	11/9/00	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
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We hereby claim benefit under 35 U.S.C. § 119(e) of any United States provisional application(s) listed below

Application Serial No.	Filing Date

We hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s), or § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. § 112, we acknowledge the duty to disclose information which is material to patentability as defined in 37 C.F.R. § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

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We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under § 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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